

"VISUAL PERCEPTION OF DEPTH-FROM-OCCLUSION: A NEURAL NETWORK MODEL"

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PROGRESS REPORT

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This report covers research activity during the three month period from 6/1/90 to 9/1/90. We have been engaged in several preparatory projects aimed at developing a biologically-based model of how the visual cortex extracts depth-from-occlusion. Our major effort has focused on writing software for a large-scale neural network simulator. This simulator, which is now nearing testing phase, will allow the simulation of physiologically based networks of hundreds of thousands of interconnected cells. The simulator features a graphical user interface that controls the building, analyzing, running, and monitoring of multiple interconnected networks. The states of neurons (voltage, firing rate, ion concentrations, etc.) can be displayed in a variety of graphical formats depending upon the type of data required. We feel that, when complete, this package will be the most useful tool available to the community for simulating large, mapped networks. ←

We have also been formulating a more general theoretical model of how the visual cortex generates responses to illusory contours. Most current physiological and network models of the phenomenon (S. Grossberg, S. Ullman, W. Richards, R. von der Heydt, and our own previous model) depend upon first detecting local cues to occlusion and then interpolating contours between these cues. However, much of the psychophysical evidence points to the importance of global aspects of the resulting "occluding" object. (For instance, if one of the three pacmen is removed in the classical Kanizsa triangle, the illusion is destroyed). We have thus implemented a low-level "global" step in the process which begins to locally identify foreground and background--before object discrimination occurs. We are currently designing the network implementation of this process.

Finally, we are continuing to build up our facilities for computation (we now have a small SUN Sparcstation SLC connected to the main Sparcstation). In addition, we are working in cooperation with IBM for the development of a system based on RISC 6000 workstations, which will allow the simulation of networks much larger than those allowed by current equipment.

Statement A per telecon
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REFERENCES: NW 3/31/92

Finkel, L.H. (1990) "The Construction of Perception" in ZONE Books, vol. 6, J. Cray, ed., Urzone Inc., New York (In Press).

Reeke, G.N., Finkel, L.H., and Edelman, G.M. (1990) Selective Recognition Automata, in An Introduction to Neural and Electronic Networks, S.F. Zornetzer, J.L. Davis, and C. Lau, eds., pp. 203-225, Academic Press, New York.

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